

超级电容器产品规格书

SUPERCAPACITOR PRODUCT SPECIFICATION

产品类型： 高压系列组合式超级电容器

Product Type: High voltage series combination Supercapacitors

产品型号： FH15R0Z486S-V3052PY-DK41

版本号（Version）： V3.1

日期（DATE）： 2025 年 3 月 5 日

编制 Prepared	审核 Checked	批准 Approved	客户回签 Customer signature back
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修改履历
AMENDMENT RECORDS

版本 Ver. No.	内容 Description	日期 Date	修改 Revised	审核 Checked
V3.0	新制订 New formulation	2025/03/03	刘知航 Zhihang Liu	袁建才 Jiancai Yuan
V3.1	1、额定电压范围 6~12V 调整为工作电压范围 0~15V 1、The rated voltage range of 6~12V has been changed to an operating voltage range of 0~15V.	2025/03/05	刘知航 Zhihang Liu	袁建才 Jiancai Yuan

产品规格书 Product specification

产品特点 Features

内阻低，功率密度高； Low internal resistance and high power density;

自放电率小，72 小时自放电<20%;

Self-discharge rate is small, 72 hours self-discharge <20%;

优异的循环寿命，库仑效率达 95%以上;

Excellent cycle life, the coulomb efficiency is more than 95%;

工作温度范围宽;

Wide operating temperature range;

绿色环保，满足 RoHs 要求;

Green, meet RoHs requirements;

应用 Applications

智能仪表、行车记录仪、照明灯具、智能家居、工业控制;

Intelligent instrument, automobile data recorder, illumination lamp, smart home, industrial control;

税控收款机、数码相机、电动工具、电动玩具、备用电源;

Fiscal cash register, digital camera, power tools, electric toy, emergency power supply,

无线节能鼠标、无线手写板、SSD 固态硬盘、医疗设备。

Wireless energy saving mouse, wireless handwriting board, SSD solid state drive, medical equipment.

型号命名规则 Part Number System

F	H	1	5	R	0	Z	4	8	6	S	V	3	0	5	2	P	Y	DK41		
品牌代码 Brand FH		额定电压 The rated voltage		结构 Structure		额定容量 Rated Capacitance		容量偏差 Permitting capacitance error		特性 Series		单体尺寸 φD*L/mm Dimensions		封装类型 Package type		引出方式 Lead out mode		预留（省略） Reserve(omit)		
		2R7	2.7V	L	引针式 Radial Type	104	0.1F	X	-10%~+30%	N	常规 Normal	0612	6.3*12.5	P	PET套管 PET Sleeve	A	两侧引针 Both sides lead out	客户代码、 客户代号 Customer code or internal code,etc		
		2R8	2.8V			224	0.22F					0622	6.3*22							
		3R0	3.0V			334	0.33F					0813	8*13							
		5R0	5.0V	S	盖板式 Cover plate type	474	0.47F	V	-10%~+10%	H	高温 High Temperature	0816	8*16	F	方形塑料 壳灌封 Square plastic shell potting type	B	中间横向引针 Middle lateral lead out			
		5R5	5.5V			504	0.5F					0820	8*20							
		6R0	6.0V			105	1.0F					0824	8*24							
		7R5	7.5V	W	螺柱式 Stud type	155	1.5F	S	0%~+50%	L	低内阻 Low ESR	1020	10*20	Y	圆角塑料 壳灌封 Fillet plastic shell potting type	C	中间纵向引针 Middle longitudinal lead out			
		12R0	12.0V			205	2.0F					1025	10*25							
		13R5	13.5V			255	2.5F					1220	12.5*20							
		25R0	25V	K	螺纹式 Screw type	305	3.0F	T	-20%~-80%	V	高电压 High Voltage	1225	12.5*25	Y	塑料壳 灌封 plastic shell potting type	Y	引线引出 Wire lead out			
		48R0	48V			355	3.5F					1625	16*25							
						705	7.0F					1630	16*30							
				V	纽扣式 Coin type	106	10F													
						156	15F													
						206	20F													
				Z	组合式 Combine d type	256	25F													
		306	30F																	
		506	50F																	
				308	3000F															

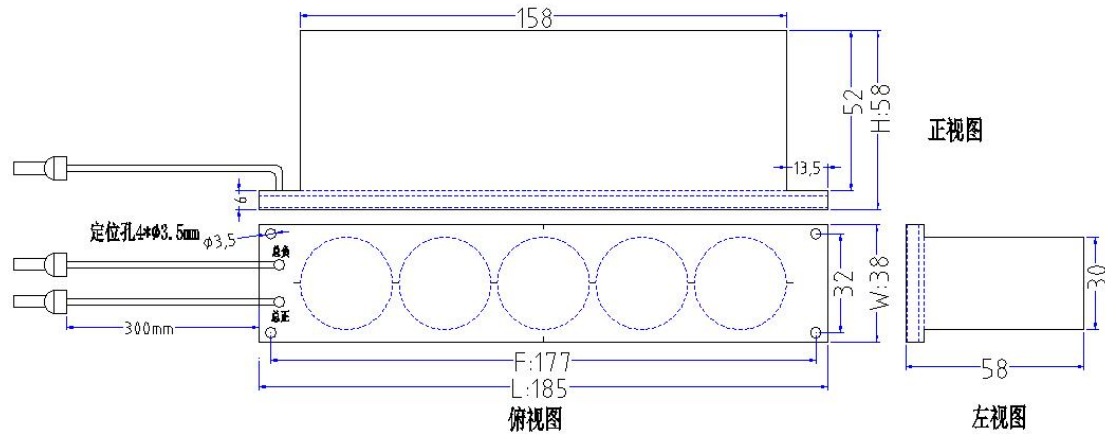
备注：上述型号仅为示例，帮助您了解我们的产品命名规则，具体产品名称及参数在产品列表中给出。

Note: the above models are only examples to help you understand our product naming rules. Specific product names and parameters are given in the product list.

➤ 产品特性 Product characteristics

项目 Project		明细 Detail	测试方法 The test conditions
工作温度范围 Category temperature range		-40℃~+70℃	
额定工作电压 Rated operating voltage		15.0V	
高温性能 High Temperature	容量△C	小于等于 30%标称值 Less than or equal to 30% of the Nominal value	施加电压 Applied voltage: 15.0V 温度 Temperature: +70℃ 时间 Time: 16h
	外观	无漏液或机械损伤 No leakage or mechanical damage	
低温性能 Low Temperature	容量△C	小于等于 30%标称值 Less than or equal to 30% of the Nominal value	施加电压 Applied voltage: 15.0V 温度 Temperature: -40℃ 时间 Time: 2h
	外观	无漏液或机械损伤 No leakage or mechanical damage	
高温存储 High Temperature Storage	容量△C	小于等于 10%标称值 Less than or equal to 10% of the Nominal value	70℃, 96h
	外观	常温下静置 2h 后, 无漏液或机械损伤 After standing for 2h at room temperature, No leakage or mechanical damage	
	ESR	小于等于规定值 2 倍 (25℃) Less than or equal to 2 times the specified value (25℃)	
循环耐久性 Cycle durability	容量△C	小于等于 30%标称值 Less than or equal to 30% of the Nominal value	额定电压下, 常温循环充放电实验 50 万次 Under the rated voltage, the cyclic charge-discharge experiment was conducted for 500,000 times at room temperature
	ESR	小于等于规定值 4 倍 (25℃) Less than or equal to 4 times the specified value (25℃)	

➤ 标准产品外形尺寸图 shape of standard product



实际尺寸及公差以参数表为准。

The actual size and tolerance shall be subject to the parameter table.

封装方式：使用塑料壳体封装。

Package: Use plastic shell package.

输出方式：14AWG 红色硅胶软线（正极），即为导线铜丝横截面为 2.5mm^2 Red lead Positive electrode:

“+”，The cross section of the copper wire is 2.5mm^2

14AWG 黑色硅胶线（负极）Black lead Negative electrode: “-”

正负极在线的尾部（即端子的那头）对应标识上 30V+/30V- 的标识。

The positive and negative terminals at the end of the line (i.e., the side with the connectors) correspond to the markings 30V+ and 30V-.

PCB 的元器件上需贴一层 2mm 厚的 EVA，EVA 上再贴一层青稞纸。

A 2mm thick layer of EVA needs to be applied to the components on the PCB, followed by a layer of rice paper.

模组外壳封装(用 PVC 热缩膜)，在热缩膜上贴上出厂标签,标签内容如下：

生产日期根据实际的生产日期填写，体现到年/月，例如：2025.02

The module shell is packaged (with PVC heat shrink film), and the factory label is affixed to the heat shrink film. The label content is as follows:

The production date is set based on the actual production date and reflected in the year/month, for example, 2025.02

产品名称：超级电容模组

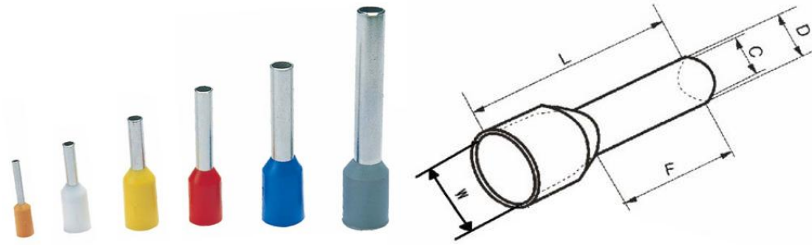
产品规格：15V48F

产品型号：FH15R0Z486S-V3052PY-DK41

生产日期：

广东风华超容科技有限公司

输出端子辅助说明 Output terminal auxiliary description:



端子名称：管形预绝缘端头 材料：导电材料为紫铜，绝缘套 PP 表面：镀锡								
Terminal name: Tubular pre-insulated terminal Material: Conductive material is purple copper, insulating sleeve is PP Surface: Tin-plated								
适用导线面积 Applicable wire cross-sectional area	型号 Part Number	订货号 Order number	颜色 Color	产品尺寸 Size/ mm				
				W	L	C	F	D
2.5mm ²	RTB2.5/8JT	999015	蓝色	4	15.2	2.3	8	2.6

➤ 标准产品规定值及尺寸 Spec. value of standard product and dimensions

型号 Part Number	额定电压 Rated Voltage (V)	额定电容 Rated Capacitance (F)	最大内阻 (AC) MAX ESR (mΩ)	漏电流 Leakage Current (25°C24h, mA)	最大峰值电流 ¹ Maximum Peak Current (25°C <1s, A)	产品尺寸 Size/ mm			
						L ± 3.0	W ± 3.0	H ± 3.0	F ± 3.0
FH15R0Z486S-V3052PY-DK41	15.0	48.0	120	4	53.25	185	38	58	177

NOTE:

1. 最大峰值电流: 1s 从额定电压 U_R 放电至 $1/2U_R$ 的电流值。

Maximum Peak Current: Is the current taking 1 sec. to discharge from U_R to $1/2U_R$.

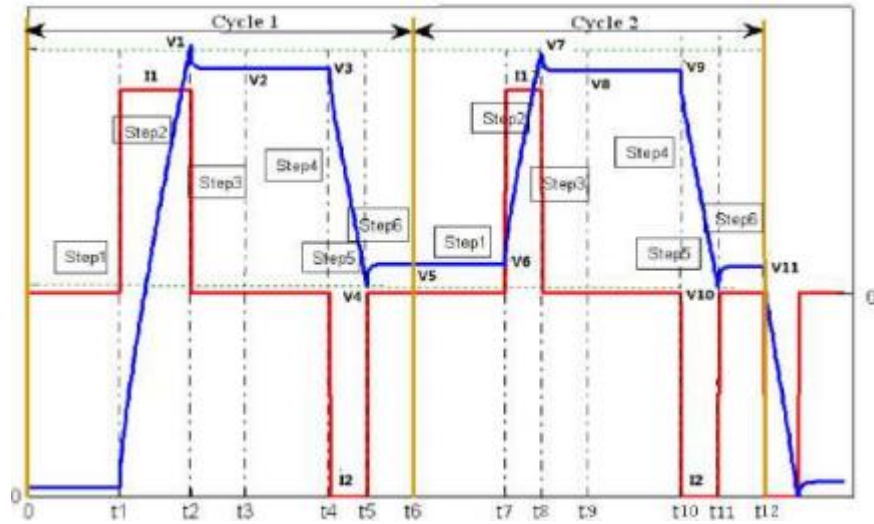
➤ 模组整体参数

序号	项目	参数值	备注
1	浪涌电压 Surge voltage	15.5V	
2	封装方式 Packaging method	1P5S	单颗 240F3.0V Single 240F3.0V
3	单颗尺寸规格 Individual size specifications	直径 30mm、高 52mm Diameter 30mm, height 52mm	
4	存储温度范围 Storage temperature range	-40~+70℃	
5	工作电压范围 Operating voltage range	0~15V	
6	额定电流 (5S) Rated current (5S)	33.46A	
7	湿度特性 Humidity characteristic	≤95%	
8	充电电压范围 Charging voltage range	≤29.5V	
9	均压方式 Balancing voltage type	配备均压电路 Equipped with voltage balancing circuit	
10	储存能量 Stored energy	5400J	

➤ 产品测试方法 Testing method

额定容量(六步法, F)和直流内阻(六步法, Ω)

Rated Capacitance (six-step, F) and DC internal resistance (six-step, Ω)



参数计算 Parameter calculation:

No.	项 目 Items	条件 condition	备注 Remark
1	搁置 10s Shelve 10s		V_0
2	恒流充电 I_1 Constant current charging I_1	以 I_1 恒流充电至额定电压 UR Charge at I_1 constant current to rated voltage UR	I_1 、 V_1
3	搁置 5s Shelve 5s		
4	搁置 10s Shelve 10s		V_3 、 t_4
5	恒流放电 I_2 Constant current charging I_2	以 I_2 恒流放电至 50%UR Constant discharge at I_2 to 50%UR	I_2 、 V_4 、 t_5
6	搁置 5s Shelve 5s		V_5 、 t_6
7	重复步骤 1-6, 重复 1 次 Repeat steps 1-6, repeat once		T_{10} 、 t_{11} 、 V_9 、 V_{10} 、 V_{11}
8	结束 End	以 I_2 恒流放电至 0.1V 以下 Constant discharge of I_2 to below 0.1V	

- 两次循环放电容量 Two-cycle discharge capacity:

$$Cd_{ch1} = I_2 \times \frac{t_5 - t_4}{V_3 - V_4};$$

$$Cd_{ch2} = I_2 \times \frac{t_{11} - t_{10}}{V_9 - V_{10}}$$

- 放电容量 Discharge capacity:

$$Cd_{ch} = \frac{Cd_{ch1} + Cd_{ch2}}{2}$$

- 两次循环放电直流内阻 Two-cycle discharge DC internal resistance:

$$ESR_{dch1} = \frac{V_5 - V_4}{I_2};$$

$$ESR_{dch2} = \frac{V_{11} - V_{10}}{I_2}$$

- 直流放电内阻 DC discharge resistance:

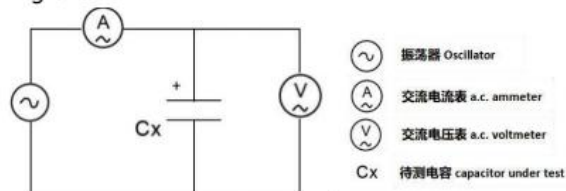
$$ESR_{dch} = \frac{ESR_{dch1} + ESR_{dch2}}{2}$$

Among them: $I_1=I_2=100A$, in the parameter table, the DC internal resistance refers to the six-step DC discharge internal resistance.

*其中: $I_1=I_2=100A$, 参数表中, 直流内阻 ESR_{DC} 指六步法直流放电内阻。

交流内阻 ESR (Ω) AC internal resistance:

测量电路 Measuring circuit



内阻计算公式 ESR calculation: $R_{AC} = R_{AC} = \frac{U}{I}$

U: 交流电压有效值 AC voltage rms (V r.m.s)

I: 交流电流有效值 AC current rms (A r.m.s)

测量电压的频率 Measurement frequency of the voltage: 1 kHz;

测量交流电流 Measurement the AC current: 1mA ~ 10mA

最大持续电流 Maximum Continuous Current:

最大持续工作电流 ($\Delta T=15^\circ C$):

Maximum continuous working current within $15^\circ C$ of temperature change

$$I_{cc} = \sqrt{\frac{\Delta T}{ESR_{DC} * R_{th}}}$$

最大峰值电流 Maximum Peak Current (A):

一秒钟放电至一半额定电压的最大放电电流:

Maximum current needed to discharged from rated voltage to half rated voltage in 1 second:

$$I_{\max} = \frac{\frac{1}{2} \times U_R}{ESR_{DC} + \frac{1}{C}}$$

能量与功率 Energy and Power:

最大储存能量 Maximum stored energy (Wh) :

$$E_{\max} = \frac{\frac{1}{2} \times C \times U_R^2}{3600}$$

能量密度 Specific Energy (Wh kg) :

$$E_d = \frac{\frac{1}{2} \times C \times U_R^2}{3600 \times \text{mass}}$$

功率密度 Usable Specific Power (W kg) :

$$P_d = \frac{0.12 \times U_R^2}{ESR_{DC} \times \text{mass}}$$

➤ 使用注意事项 Cautions For Use

● 超级电容器应在额定电压和规定工作温度区间使用，不宜超过 70℃，并远离超过工作温度区间的热源；

The capacitor should be used in the rated voltage and specified operating temperature range with no more than 70 °C, and stay away from heat sources that exceed the operating temperature range;

● 超级电容器在使用前需确认正/负极，禁止反向充电。若正负极接反，会降低超级电容器的充放电性能，并会导致发热、泄露和使用寿命快速衰减。

The positive/negative electrodes of the capacitor must be confirmed before use, and reverse charging is prohibited. The reverse connection will reduce the performances of the capacitor and cause heat cause heat generation, leakage and rapid deterioration of service life;

● 超级电容器在使用前用干布对正/负极端子进行清洁，避免接触电阻过大降低超级电容使用性能。

Clean the positive/negative terminals with a dry cloth before use to avoid excessive contact resistance, which would degrade the performances of the capacitor;

● 禁止将超级电容器投入火中或进行高压加热。

Do not put the capacitor into fire or heat it under high pressure;

● 禁止将超级电容直接与水、油、酸或碱接触。

Do not contact directly the capacitor with water, oil, acid or alkali ;

● 禁止挤压、钉刺和拆解超级电容器。

Do not squeeze, prick and disassemble the capacitor;

● 禁止将带有 0.5V 以上电压的超级电容器进行正/负极短接；

Do not short-circuit the positive/negative electrodes of the capacitor with voltages above 0.5V;

● 在使用或储存期间如发现超级电容器有散发气味、变色、变形或其它反常之处应停止使用。

Stop using the capacitor if it is found to emit odor, discoloration, deformation or other abnormalities during use or storage;

● 超级电容器所使用的电解液极易挥发，请不要随意分解超级电容器。

Do not disassemble the capacitor at will because the electrolyte is volatile;

● 超级电容器不能随意丢弃，需请根据国家环保标准进行处理。

Do not discard the capacitor at will, Please dispose of it according to national environmental protection standards.